

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

### Improvements in Electrical Apparatus Boxes.

I, KARL JOHAN JUNGHOLM, of Torsgatan 19, Stockholm, Sweden, a subject of the King of Sweden, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus boxes for electrical installations and more particularly to that kind of such boxes which contains safety fuses with or without switch poles associated therewith and arranged on the rear wall of the box or on bases substantially parallel to said rear wall.

In boxes of this kind it has been already proposed to mount bus bars connected with said fuses. In such designs as hitherto proposed, however, the position of said bus-bars is determined by the positions of the fuses, or vice versa, whereby the whole structure will be bulky and complicated, especially in case of plurality of bus-bars.

The object of this invention is to provide a more compact design of such boxes and a compact and simple arrangement of the connection of the incoming and outgoing lines to the apparatus contained in the boxes and of the electrical and mechanical connection of such a box to another box or boxes.

According to the invention two or more bus-bars are provided between one or more of said rows of fuses or switch poles and the rear wall in a plane substantially parallel to the said wall the bus-bars being adapted to be connected to any apparatus desired by means of separate connecting links within the box.

Another feature according to the invention consists in this that means are provided to permit direct connection of a similar box to the upper or lower side of the box to obtain a row of boxes in a direction at right angles to the direc-

tion of the bus-bars. A further feature consists in this that the main line is connected to the primary terminals of the switch poles or fuses, whereas the bus-bars are connected to the secondary terminals of said elements, to permit the box to be used as a main switch board in which case also independent groups of lines may be connected to the secondary terminals of said elements.

By the features just mentioned the apparatus box with its associated apparatus and bus-bars will form a unitary structure which may be easily combined with other apparatus boxes, where required by the electrical installation, and may be provided with the connecting lines required.

By this arrangement the following advantages are achieved, namely, first, that the apparatus boxes may be directly combined with one another or with other apparatus boxes having bus-bars by means of a system of connecting members similar to the bus-bars, and, secondly, that the fuses associated with the various bus-bars may be placed in a single row parallel to the longitudinal direction of the bus-bars without necessitating any enlargement of the box. Due to the said last-mentioned feature the aperture of the apparatus box necessary to permit access to the fuses may be made comparatively small thereby reducing the possibility of unintentional contact with the uncovered parts upon which voltage is impressed.

Arrangements according to the invention are illustrated in the accompanying drawing which shows several embodiments thereof.

Fig. 1 is a longitudinal section of one embodiment;

Fig. 2 is a horizontal section thereof;

Fig. 3 is a longitudinal section of a second embodiment;

Fig. 4 is a horizontal section thereof;

[Price 1/-]

Figs. 5 and 6 are similar views of a third embodiment;

Figs. 7 and 8 are similar views of a fourth embodiment;

5 Figs. 9 and 10 are similar views of a fifth embodiment, and

Figs. 11 and 12 are similar views of a sixth embodiment.

With reference to Figs. 1 and 2, an insulating plate 40 is attached to the rear wall of the box 1 inside thereof. The plate 40 serves both as an insulating base to receive the switch 3 and a carrier for the bus-bars 2 which may be placed in open grooves in said disc or moulded therein. Said bus-bars 2 are shown connected to the primary terminals of the switch by connecting links 4. The bus-bars extend in the transverse direction of the box from one vertical side wall thereof to the other. Said side walls are formed with apertures in register with the ends of the bus-bars to permit connection of the bus-bars to the bus-bars of another apparatus box, as 5 (Fig. 2), or of a main line, as 6. The bus-bars of the boxes 1 and 5 are connected to each other by means of separate connecting members 7, surrounded by a bushing 8 forming at the same time a mechanical connection between said two boxes 1 and 5. Placed inside the box 1 at a higher level than that of the switch 3 are a number of safety-fuses 10, shown as connected by connecting links 100 to the secondary terminals of switch 3.

The outgoing lines 11 from said fuses extend through the upper horizontal wall 9 of the box 1. Attached to the lower horizontal wall 12 of said box is another box 13, which does not contain any bus-bars. Instead of said box 13, however, there may be attached to the wall 12 a main line or a box containing bus-bars which may be connected in any suitable way to the bus-bars of the box 1 to form a double bus-bar system.

In the drawing the current is assumed to be fed to the box 1 by the main line 6 from which the current is branched off upwardly through the switch 3 and the fuses 10 to the associated apparatus and downwardly to the box 13, and also through the bus-bars 2 to flow then through the connecting members 7 to the bus-bars of the box 5. The switch may thus in such case control only the current flow through the fuses. In such case an apparatus box may further be connected to the box 1 without the use of connecting members extending directly to the bus-bars.

If the current be impressed by a main line incoming through the lower wall 12 and connected to the primary or lower

terminals of the switch, while the links 4 are connected to the secondary or upper terminals of the switch, the switch could be used either to control only the current flowing through the fuses, provided but one box is used, or, in case of a number of boxes, to control the entire current flow through the bus-bars, and in said last-mentioned case the switch will act as a main switch of the associated boxes receiving their current through the bus-bars. 70 75

The connecting links 4 are designed so as to permit any connection desired of the bus-bars with any apparatus desired, so that, for instance, the secondary terminals of the fuses may be connected to the bus-bars situated behind the switch, as already hereinbefore mentioned. 80

In the embodiment shown in Figs. 3 and 4, bus-bars 21 are provided within the apparatus box 1 only behind the fuses 10, said bus-bars being connected to the primary terminals of the switch 3 by connecting links 41. The fuses 10 are shown connected to the secondary terminals of switch 3 by links 100. The connection of another apparatus box and of a main line in the longitudinal direction of the bus-bars may be made in a similar way to that described in connection with Figs. 1 and 2, and, moreover, upwardly extending outgoing lines 11 may be provided. Another apparatus box or a main line may be provided at the lower wall 12 of the box. The methods of using said box are similar to those already described in connection with Figs. 1 and 2. Also in this case the links 41 permit any connections desired as, for instance, of the secondary terminals of the switch to the bus-bars. 85 90 95 100 105

The embodiment shown in Figs. 5 and 6 differs from those described above in that bus-bars 2, 21, are provided both behind the switch 3 and behind the fuses 10, each side wall of the box 1 having, accordingly, two openings, one for each set of bus-bars, to permit the connection thereof to the bus-bars of other apparatus boxes, as shown, or to main lines. 110 115

In case the main current is impressed on the bus-bars 21 situated behind the fuses 10, the switch 3 may be used to control only the current flow in those lines 11 outgoing from the fuses, in which case the connecting links 41 from the bus-bars 21 are connected to the links 4 connecting the bus-bars 2 with the primary or lower terminals of the switch 3. If, on the other hand, the current is impressed on the bus-bars 2 behind the switch 3, said switch may be used either to control only the current flow to the outgoing lines 11 of the fuses, in which 120 125 130

case the connections are as just described, or to control even the current flow to the bus-bars 21 situated behind the fuses, in which case the connections are as shown in the drawing, namely, with the connecting links 41 connected to the secondary terminals of the switch by means of the connecting links 42. If the current comes in upon a main line 61 in the transverse direction of the bus-bars, the switch may be used besides for the control operations above described, also to control the current flow to the bus-bars behind the switch, in which case the connecting links 4 are connected to the secondary terminals of the switch rather than to the primary terminals thereof. If the current were impressed on the primary terminals of the switch the latter could be used to control either only the current flow through the fuses or the current flow to the fuses, as well as to the bus-bars behind (which may be connected either in front of or behind the fuses) or, moreover, also the current flow to the bus-bars situated behind the switch.

Although in the embodiments herein before described the outgoing lines extend through the upper wall of the box the boxes may also be designed so that the outgoing lines extend through the lower side of the boxes. Such an embodiment is illustrated in Figs. 7 and 8, where the bus-bars 2 are situated behind the switch poles 3, and the fuses 10 are placed adjacent the lower wall (not shown in the drawing) through which the outgoing lines (not shown) from the fuses 10 extend.

In the drawings these connecting links, by means of which the bus-bars are connected to the switch poles and the fuses, are shown as bent and connected directly to the primary terminals of the switch and fuses respectively. This connection may also be made in any other equivalent manner. The boxes may each be provided with any number of fuses and bus-bars desired and likewise the switches may have any number of contacts desired.

If connection is not required at both ends of the bus-bars, the aperture or apertures of that side wall where no connection is to be made may be dispensed with or closed by a cover. Similarly that opening at right angles to the bus-bars adapted to permit connection of another apparatus box or of a main line may be dispensed with or closed by a cover when such connection is not required.

The connecting links inside the boxes which connect the bus-bars to the respec-

tive apparatus permit the apparatus to be placed in any position desired, relatively to the bus-bars, so that, as shown in the drawings in connection with the fuses, they may be situated, for instance on a straight line or row side by side irrespective of the fact that the respective bus-bars are displaced vertically relatively to each other.

All of the embodiments above described have reference to apparatus boxes containing both switch poles and fuses.

In Figs. 9 and 10 an apparatus box is shown which only contains fuses.

As in the embodiments herein before described an insulating plate is attached to the inside of the rear wall of the box 1 and carries the bus-bars 22, which may either engage open grooves 30 in the disc 4 or be moulded therein. The fuses 10 are arranged in a row directly on the plate 40 and connected to the respective bus-bars by connecting links 42. The outgoing lines 11 extend through one of those walls of the box parallel to the bus-bars, and to the other of said walls as 12, an apparatus box 13, as shown, or a main line may be connected, said other box or main line being electrically connected to the connecting links 42 or to the primary terminals of the fuses. To each side wall of the box an apparatus box 5 similar to the box 1 or a main line may be connected. The boxes 1 and 5 are electrically connected together by means of connecting members 7 interconnecting the bus-bars of said boxes.

Figs. 11 and 12 illustrate the connection of a meter box to an apparatus box 1 containing switch poles as 3, and fuses as 10, and having bus-bars behind the fuses. The meter box 50 is shown situated at the upper wall of the box 1. The meter 51 is connected between the secondary terminals of the fuses 10 (by the connecting links 52) and the bus-bars 21 (by the connecting links 53). In such case that apparatus box as 1 to which the meter is connected will serve both as a main switch board in front of the meter and as a distributing board for those bus-bars or apparatus boxes receiving their current through the meter.

It is to be noted that meter boxes may be similarly connected to the other types of apparatus boxes shown in the drawings.

Within the apparatus boxes fuses of a different type to that shown may be used as, for instance, fuses screwed into metal clips or bridges attached to the insulating disc carrying the bus-bars to carry the current flow from the fuses.

It is also to be noted that further modifications may be made.

If necessary double sets of bus-bars may be provided within one and the same box.

Hereinbefore it is assumed to use separate connecting members between the bus-bars of adjacent boxes. If desired the bus-bars may be made sufficiently long to be directly connected to the bus-bars of adjacent boxes without the aid of separate connecting members.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An electrical apparatus box having openings formed in its side walls and containing safety fuses and if desired also switch poles arranged in rows on the rear wall of the box or on bases substantially parallel to said rear wall, characterised in this, that two or more bus-bars are provided between one or more of said rows and said rear wall in a plane substantially parallel to said wall, the bus-bars being adapted to be connected to

any apparatus desired by means of separate connecting links within the box.

2. An electrical apparatus box as claimed in Claim 1, characterised in this, that means are provided to permit direct connection of a similar box to the upper or lower side of the box to obtain a row of boxes in a direction at right angles to the direction of the bus-bars.

3. An electrical apparatus box as claimed in Claim 1, characterised in this that the main line is connected to the primary terminals of the switch poles or fuses, whereas the bus-bars are connected to the secondary terminals of said elements, to permit the box to be used as a main switch board in which case also independent groups of lines may be connected to the secondary terminals of said elements.

Dated this 18th day of March, 1926.

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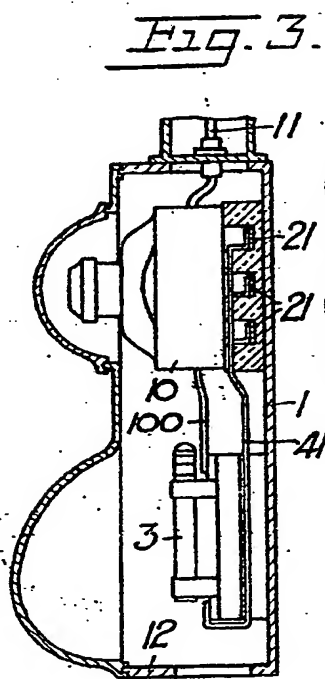
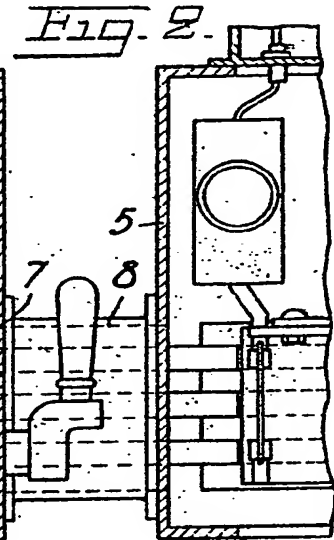
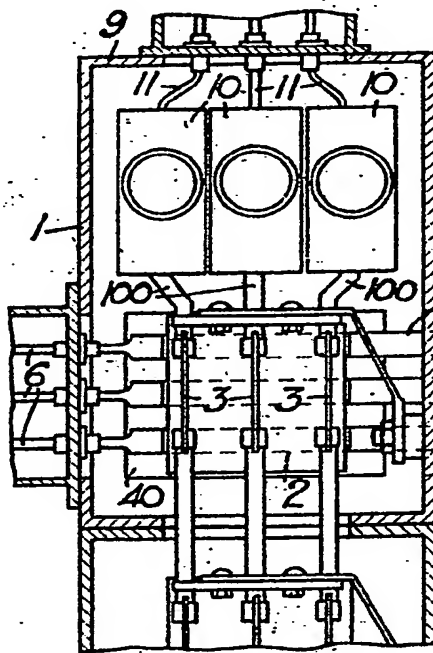
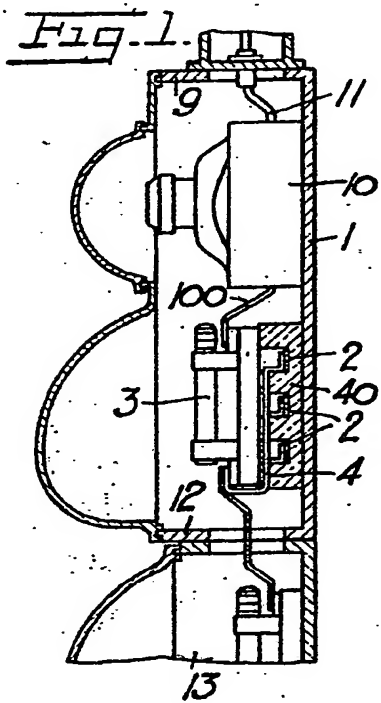
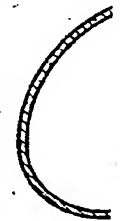


Fig.



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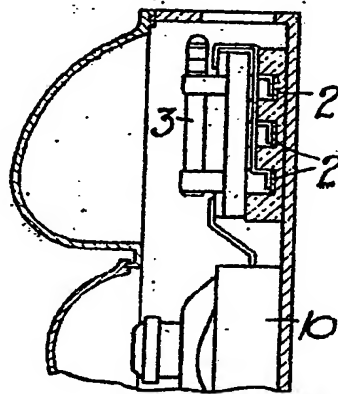
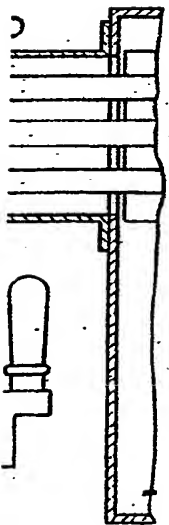
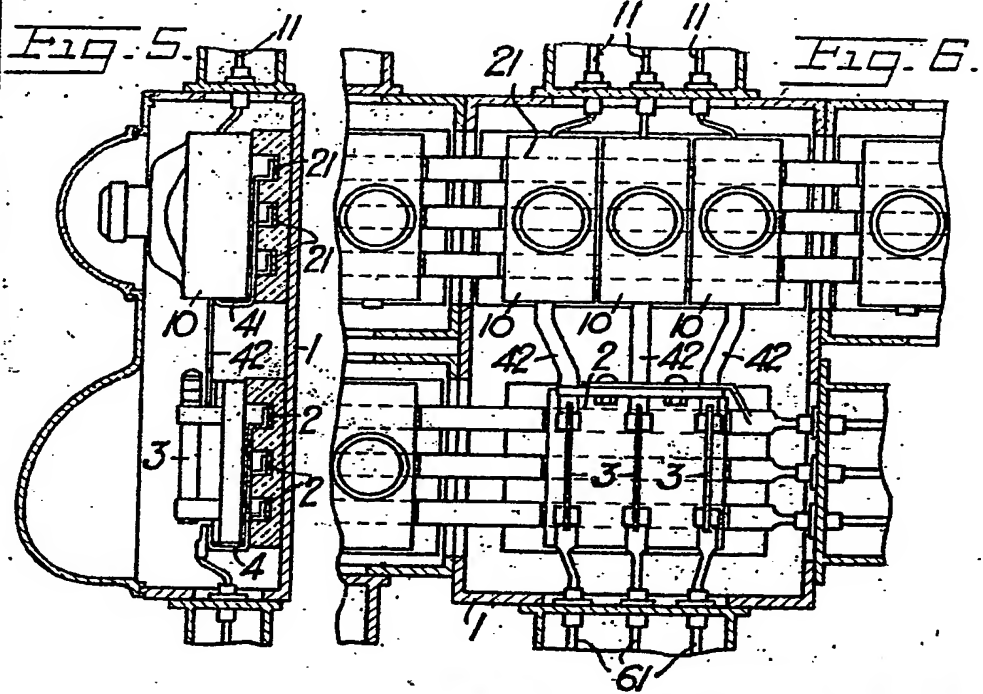
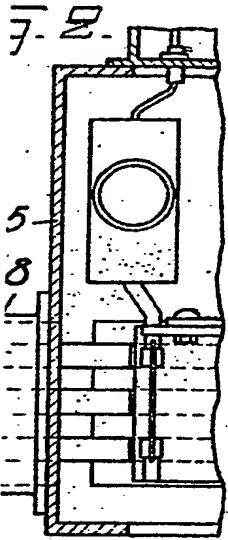


Fig. 7.

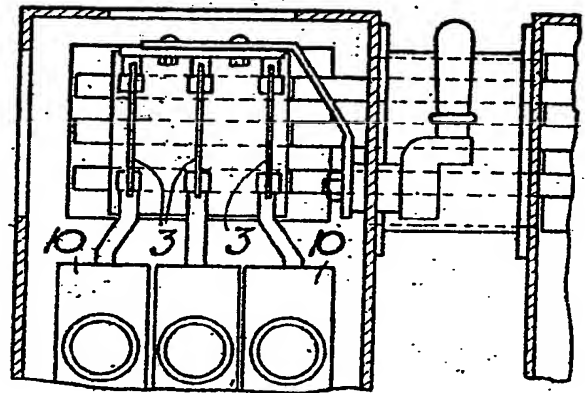


Fig. 8.

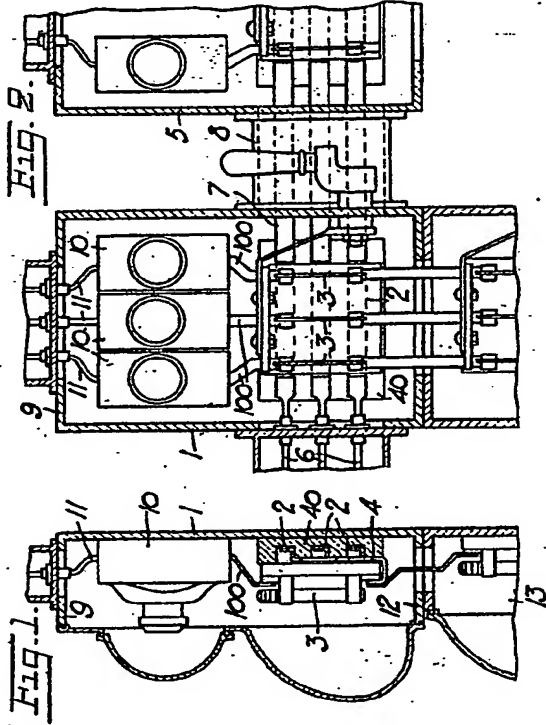


Fig. 3.

Fig. 4.

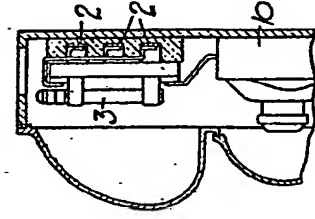
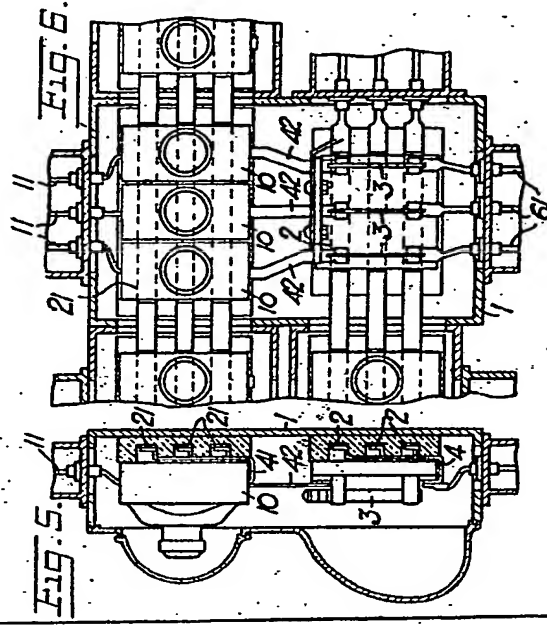
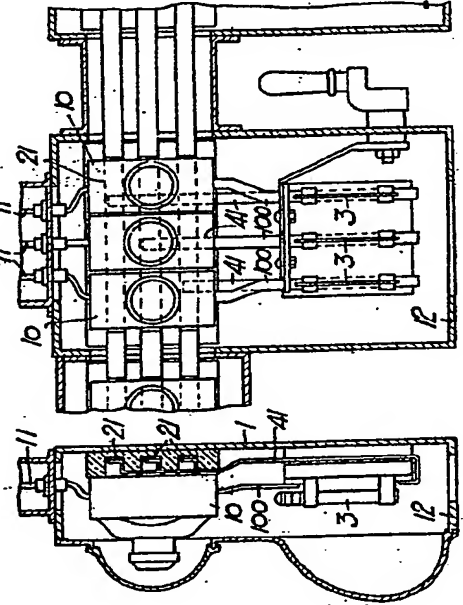


Fig. 7.

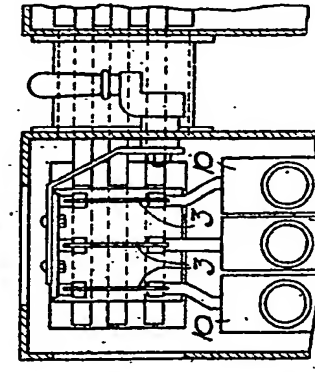


Fig. 8.

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